TITLE OF THE INVENTION

Buoyant Hand Tool

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Patent Application Serial No. 10/336,051 filed January 3, 2003.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable

INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

Not applicable

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to hand tool construction, and more particularly to lightweight non-conductive corrosion-resistant hand tools having water buoyant characteristics for use by fishermen and boaters and others using such tools in the vicinity of water and/or electricity.

Description of Related Art

Boaters and fishermen and others who use hand tools in the vicinity of water are notorious for dropping hand tools irretrievably into the water. If the tool happens to be fabricated of metallic material, magnets may be used at the end of a long flexible line to afford some chance of retrieval. Additionally, use of metallic hand tools around salt water will quickly cause substantial, detrimental corrosion in the form of surface rust on such hand tools.

1

A broader concern for users of such hand tools is with respect to the presence of water on the ground or floor surface or carelessness while using a conductive hand tool around sources of electric power and energized wiring and connectors therefor.

To address the issue of buoyancy in water, Kreitz teaches a set of floating pliers in U.S. Patent 4,185,523 wherein a block of closed cell polymeric foam is inserted between the handle portions of the lever members to provide sufficient flotation to render the pliers buoyant and also to provide a resilient automatic jaw opening mechanism during use.

In U.S. Patent 5,865,077, Moffitt discloses floating, non-conductive hand tools in the form of pliers or channel locks which utilize non-conductive lever members pivotally connected together. Water buoyancy is achieved either by entrapping gas or air within a sealed airtight hollow cavity formed within the handle portion of each lever member by special manufacturing methods and apparatus and/or by providing a closed-bottomed sheathing material having a low density substantially below that of water fitted over the end of the handle portion of each lever member. A further enhancement of that disclosure by Moffitt is shown in U.S. Patent 6,202,518 which additionally teaches wear resistant removable jaw members and a line cutter interconnected to one of the handle portions of one lever member thereof.

Pliers made from a plastic material are disclosed in U.S. Patent 4,023,450 invented by Ygfors whose basic object is to produce pliers suitable for picking up small objects.

The present invention discloses light weight non-conductive, substantially non-corrosive water buoyant hand tools which achieves water buoyancy through the cooperative effects of an elongated low density sleeve open at each end thereof and

fitted over the handle portions of each lever member to sealingly enclose one or more open air cavities formed in outwardly opening fashion into each handle portion.

BRIEF SUMMARY OF THE INVENTION

This invention is directed to non-conductive substantially buoyant-in-water hand tools comprising a non-conductive handle portion and a working tool portion, the handle portion being formed of material having a density greater than water. The handle portion has one or more outwardly opening cavities formed into a side surface of the handle portion. An elongated tubular sheath covers and sealingly encloses the cavities of each handle portion whereby the effective density of each hand tool to less than that of water.

It is therefore an object of this invention to provide a lightweight non-conductive hand tool having buoyancy in water.

It is another object of this invention to provide substantially non-corrosive hand tools which are substantially non-corrosive and water buoyant, particularly in salt water.

Still another object of this invention is to provide non-conductive, non-corrosive hand tools which achieves buoyancy in water by the cooperative effect of outwardly opening cavities formed into the handle portion which are sealably covered by an elongated tubular sheath formed of low density foam material.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Figure 1 is a front elevation view of one embodiment of the invention.

Figure 2 is a side elevation view of Figure 1.

Figure 3 is a perspective view of the invention shown in Figure 1.

Figure 4 is another perspective view of the invention shown in Figure 1.

Figure 5 is a front elevation view of another embodiment of the invention.

Figure 6 is a side elevation view of Figure 5.

Figure 7 is a perspective view of the invention of Figure 5.

Figure 8 is another perspective view of the invention of Figure 5.

Figure 9 is a front elevation view of still another embodiment of the invention.

Figure 10 is a side elevation view of Figure 9.

Figure 11 is a perspective view of the invention of Figure 9.

Figure 12 is another perspective view of the invention of Figure 9.

Figure 13 is an enlarged view of the central pivot portion and jaw portion in a closed position thereof of the invention of Figure 1.

Figure 14 is a view similar to that of Figure 13 showing the jaw portions in a partially opened position.

Figure 15 is a view similar to Figure 14 showing the jaws in a fully opened position.

Figure 16 is a perspective view of the jaw portion and central pivot portion of one of the lever members of Figure 1.

Figure 17 is a perspective view of the jaw and central portion of the other lever member of Figure 1.

Figure 18 is a view of the invention as shown in Figure 5 with added hidden detail thereof particularly with respect to the handle portions.

Figure 19 is an enlarged section view in the direction of arrows 19-19 in Figure 18.

Figure 20 is a perspective exploded view of the invention as shown in Figure 5.

Figure 21 is an enlarged section view in the direction of arrows 21-21 in Figure 13.

Figure 22 is an enlargement of area 22 in Figure 21.

Figure 23 is a section view in the direction of arrows 23-23 in Figure 14.

Figure 24 is an enlargement of area 24 in Figure 23.

Figure 25 is a perspective view of yet another embodiment of the invention in the form of a single-handled hand tool.

Figure 26 is an exploded view of Figure 25.

Figure 27 is an exploded view of a filet knife embodiment of the invention.

Figure 28 is an enlarged view of the assembled handle portion of Figure 27.

Figure 29 broken is a perspective view of a fish gaff embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, and particularly to Figures 1 to 4, one embodiment of the invention is there shown generally at numeral 10. This embodiment 10 is in the form of a pair of pliers having elongated handle portions 28 and 30 and shorter jaw portions 18 and 20, each forming respective end portions of lever members 12 and 14, respectively.

The two lever members 12 and 14 are pivotally connected together at their central overlapping portions about a pivotal axis 15. A retaining cap 16, described herebelow secures the two lever members 12 and 14 together. These components are formed of molded plastic or fiberglass material generally, and are preferably formed of a 43% glass fiber reinforced NYLON produced by Polyplastics Celanese, Nylon PA-66, Material No. 1603-2 having a relatively low density of 1.47 g/cc. The mating facing surfaces 22 of each of the jaw portions 18 and 20, respectively, are serrated or grooved for enhanced

gripping of objects therebetween when the handle portions 28 and 30 are first opened, then placed around an object and then squeezed for retention within the jaw portions 18 and 20 in a well-known manner.

A cutting blade **24** is secured within jaw portion **18** which is aligned with and generally bears against the mating flat facing surface **26** of jaw portion **20** to effect cutting of material objects in a conventional manner.

Each of the handle portions 28 and 30 are substantially covered by tubular low-density sleeves 32 and 34. Each of these sleeves 32 and 34 are formed of ethylene vinyl acetate (EVA) having a wall thickness of approximately .12" and a density of approximately 0.12 g/cc. This foam material is of a closed cell design for air tightness and lightweight characteristics.

Each of the handle portions 28 and 30 include stops or flanges 46 and 48 which limit the longitudinal movement of the sheaths 32 and 34 when installed over the handle portions 28 and 30 and also include enlarged flanges 40 and 42 which are accurately positioned adjacent the distal ends 36 and 38 and accurately spaced from flanges 46 and 48, respectively, so as to prevent off movement of the sheaths 32 and 34 during use. A lanyard aperture 44 is provided in one of the distal ends 36. By this arrangement, once each of the sheaths 32 and 34 are slidably installed onto the handle portions 28 and 30, respectively, the flanges 46, 48, 40 and 42 prevent any further longitudinal movement along the handle portions 28 and 30.

Another embodiment of the invention is shown generally at numeral **50** in Figures 5 to 8. This embodiment **50** is of a shorter, stubbier nature in proportion; however, construction is very similar to that above described in Figures 1 to 4. Each of the lever

members 52 and 54 include jaw portions 58 and 60 which come together at mating serrated surfaces 62 for gripping objects therebetween. A cutting blade 64 bearing against flat surface 66 functions as previously described to cut objects. Pivotal engagement about the central pivot axis 55 is secured by retaining cap 56.

Foam low-density sheaths 72 and 74 have been slidably engaged over the handle portions 68 and 70 of each corresponding lever member 52 and 54, respectively. Flanges 80, 82, 140 and 142 prevent axial or longitudinal movement of each of the foam sheaths 72 and 74 during use.

The material selections used to mold each of the lever members 52 and 54 is as above described while the foam sheaths 72 and 64 are similarly constructed as shown and described in Figures 1 to 4. The distal end portions 76 and 78 are somewhat semi-spherical in configuration and include a lanyard aperture 84 formed into one distal portion 76 for convenient carrying.

In Figures 9 to 12, still another embodiment of the invention is there shown generally at numeral 80. This embodiment is also of a shorter, stubbier nature in proportion and includes arcuately curved jaw portions 88 and 90 and shorter, stubbier handle portions 98 and 100 of each of the lever members 82 and 84, respectively. The lever members 82 and 84 are pivotally connected at their central overlapping portions about a pivotal axis 85 and secured together by a retaining cap 86. Jaw portions 88 and 90 include serrated mating surfaces 92 and cutting edge 96 bearing against flat surface 94 as previously described. Foam low-density sheaths 102 and 104 have been slidably engaged over each of the handle portions 98 and 100 and are maintained from further axial movement during use by flanges 110, 112, 111 and 113. These sheaths 102 and

104 are formed of the above described foam material as with respect to Figures 1 to 4, as are the lever members 82 and 84. A lanyard aperture 114 in one of the two distal end portions 106 and 108 of the handle portions 98 and 100, respectively provides carrying facility.

BUOYANCY IN WATER

One of the most important features of the invention, that being buoyancy in water, is achieved as shown in Figures 18 to 20. The essence of the buoyancy of this invention is achieved through the combination of very light weight low density closed-cell foam material selected in the manufacture of each of the sheaths 72 and 74, in combination with the overall size and dimensions thereof and a series of one or more properly sized cavities 34 and 36 which are formed into the side surfaces of each of the handle portions 68 and 70.

As each of these sheaths 72 and 74 are assembled onto the handle portions 68 and 70 between flanges 80, 82, 140 and 142, each of cavities 134 and 136 are automatically sealed closed as best seen in Figure 19. These cavities 134 and 136 are formed in open fashion into the side surfaces of each of the handle portions 68 and 70 such that, when the tightly fitting sheaths 72 and 74 formed of somewhat elastic material are slidably assembled onto the handle portions 68 and 70, the airtight sealing of these cavities 134 and 136 is achieved. Note additionally that the size of each of these cavities 134 and 136 is effectively enlarged outwardly due to the fact that the actuate configuration of the inner surface of the foam sleeves 72 and 74 extends outwardly from the open perimeter of the cavity 134 and 136.

Note further that, in the preferred embodiment shown, a plurality of cavities 134 and 136 are formed into the side surfaces in opposing inward directions of each of the handle portions 68 and 70. Thus, as best seen in Figure 19, a somewhat "H"-shaped section is produced with sufficient plastic material utilized to form the web or central part of the "H"-shaped section of handle portions 68 and 70 for further increased depth of each of these cavities 134 and 136 toward the central plane of each of the handles 68 and 70 if desired for added buoyancy

Moreover, by providing multiple cavities 134 and 136 extending in end-to-end fashion on either side surface of each of the handle portions 68 and 70, should one of the sheaths 72 or 74 be punctured or cut to the extent that water is allowed to enter into and flood one or more of the cavities, only a small portion of the buoyancy of the pliers 50 results from such a breach of air-tight status.

An example utilizing the embodiment of the invention shown in Figures 5 to 8 is here provided. The pair of pliers **50**, having an overall length of 6½", has the following additional physical characteristics:

Total weight of plastic material: (3 pcs.): 59.95 g.

Total volume of plastic (3 pcs.): 39.43 cc.

Total weight of foam sheaths (2 pcs): 3.19 g.

Total volume of foam sheaths (2 pcs): 26.62 cc.

Total volume of trapped air within the cavities **134** and **136** collectively: (16 cavities): 4.50 cc.

When formed based upon the above described plastic material having a density of 1.47 g/cc and a foam material having a density of 0.12 g/cc, the effective density of the entire assembly **50** was less than 1.0 g/cc, sufficient to establish buoyancy in water.

Although it is preferred to have approximately 16 to 20 individual cavities which become fully airtight and water impervious upon installation of the tubular sheaths onto the handle portions as above described, it should be understood that one elongated open cavity formed into one or both sides of one or both of the handle portions which has a sufficiently trapped air tight volume to establish the overall buoyancy in water of the pair of pliers in combination with the above described foam sheaths is within the scope of this invention.

RESTRICTED OPENING MOVEMENT

A second important feature of the invention is with respect to the prevention of detrimental, excess opening of the pair of pliers to facilitate grasping and squeezing an object between the jaw portions which is too large for the overall strength of the lever members of the device. This aspect of the invention is seen in Figures 13 to 16 and 21 to 24. In the preferred embodiment of this aspect of the invention, two features related to the opening movement of each of the lever members 12 and 14, from the closed position as shown in Figure 13, to the partially open position shown in Figure 14 to the fully opened position shown in Figure 15, are provided. These features include both a resistive "felt" detent advising the user that the maximum limit of opening of the jaw portions 18 and 20 as seen in Figure 14 in the direction of arrow A, has been achieved. Thereafter, as the user approaches a maximum opening limit in the direction of arrow B in Figure 15, a positive limitation from further opening movement is provided as will be described more fully herebelow.

As seen in Figure 16, one of the lever arms 14 includes within its central portion between jaw portions 20 and handle portion 30, a central enlarged aperture 130 and two

radially outwardly positioned arcuate cavities 120 and 126. These cavities 120 and 126 are concentric about the pivotal axis 15 defined by aperture 130. The radial configuration of each of these arcuate cavities 120 and 126 is semi-circular in cross section as best seen in Figures 22 and 24 as described more fully herebelow.

Disposed within each of these cavities 120 and 126 are detent bumps or raised areas 122 and 128. These detent bumps 122 and 128 may be positioned symmetrically anywhere along the arcuate length of each of these cavities 120 and 126 as desired to achieve the effect of notifying a user by feel that the maximum opening of the jaw portions 18 and 20 is being approached and should not be exceeded.

The other of the lever members 12 includes a cylindrical protruding bearing portion 132 which closely mates within the cylindrical bearing aperture 130 to achieve the desired smooth pivotal opening and closing movement of the device 10. The enlarged retaining cap 16 lockably engages within the inner bore of pivotal bearing 132 to lockably secure the entire pivotal connection together.

Projecting from the facing surface of the central portion of lever member 12 are two semi-spherical projections 124 and 125. When assembled as best seen in Figures 21 to 24, these spherical projections 124 and 125 ride along within the arcuate cavities 126 and 120, respectively, in closely aligned fashion as best seen in Figure 22.

However, as the jaw portions 18 and 20 approach the preselected angular orientation A of the lever members 12 and 14 as shown in Figure 14, the spherical projections 124 and 125 encounter the detent bumps 126 and 120, respectively, which are cooperatively sized to cause a degree of interference therebetween. This amount of interference is best seen in Figures 23 and 24 at 127.

Because of the plastic material selection, although generally of a tough and durable nature, a small amount of compression and deflection will occur within this interference zone 127 whereby the lever members 12 and 14 may be opened further toward angle B in Figure 15, the maximum allowable opening of the jaw portions 18 and 20 whereupon the spherical projections 124 and 125 come to bear against the corresponding ends of each of the arcuate cavities 120 and 126.

As can be seen in Figures 23 and 24, the height of each of the detent bumps 124 and 125 is preselected to be slightly less than the mating depth of each of the arcuate cavities 120 and 126 whereby the amount of interference at 127 may be regulated. Obviously, the greater the interference, the greater the detent feel which will be felt by the user as this angular orientation of the lever members 12 and 14 is encountered.

Moreover, the placement of each of these detent bumps 122 and 128 in their angular orientation about the pivotal axis 15 may also be varied. The angular opening position A in Figure 14 may thus easily be varied as desired to be centrally positioned as shown or more closely positioned to the maximum opening position B in Figure 15 so that the user has a clear felt indication that further opening of the jaw portions 18 and 20 to grasp an object too large to be dealt with by the device 10 is achieved.

Referring now to Figures 25 and 26, a single handled hand tool embodying buoyant aspects of the present invention is there shown generally at numeral **150**. This embodiment **150** of the invention is in the form of a fish hook remover or extractor. An elongated handle assembly **52** is provided which is formed of molded plastic or fiberglass material and, preferably as previously described, of 43% glass fiber reinforced NYLON having a relatively low density of 1.47 g/cc. An elongated flexible tubular sleeve **154**

formed of low density ethylene vinyl acetate (EVA) having a wall thickness of approximately 1/8" and a density of .12 g/cc covers substantially the entire length of the handle portion 156.

The handle portion **156** includes stops or flanges **164** and **166** which are spaced apart a distance equal to the length of the sleeve **154** so as to provide end stops which eliminate any longitudinal movement of the sleeve **154** when installed onto the handle portion **156** as best seen in Figure 25.

The handle portion **156** includes an enlarged butt or distal end **162** having a lanyard hole formed therethrough and further includes an enlarged proximal end **160** for supportively receiving a fisherman's tool or work implement in the form of an elongated de-hooking shaft **168** having a U-shaped bend **170** formed at a distal end thereof for hook removal from a fish.

As previously described, buoyancy in water of this embodiment 150 is accomplished by the combination of the lighter-than-water density of the sheath 154, in combination with a plurality of cavities 158 which are molded from either side of the handle portion 156 thereinto. The cavities 158 each have a depth which approaches a central plane or web of the handle portion 156, laterally opening outwardly as shown in Figure 26.

These cavities 158 are formed in open fashion such that, when the tightly fitting tubular sheath 154, formed of the above-described somewhat elastic foam material, is slidably assembled onto the handle portion 156 as shown in Figure 26, an airtight seal of each of the cavities 158 is achieved. The lighter-than-water density of the sheath 154, in combination with the total airtight volume determined by design of the collective sealed

cavities 158, renders this embodiment 150 buoyant, with the handle assembly 152 being the uppermost floating portion at or slightly above the surface of the water for easy retrieval.

Referring now to Figures 27 and 28, still another embodiment of the invention in the form of a floating fillet knife is there shown generally at numeral 180. This embodiment 180 includes a handle assembly 182 formed of a handle portion 186, the above described molded fiberglass reinforced NYLON, the handle portion 186 having an enlarged butt or distal end portion 192 and a central enlarged proximal end portion 190 for supporting a fillet knife blade 198 extending therefrom as shown.

A sleeve 184 formed of EVA foam as above described having a wall thickness of between 1/8" and ½" and a density of approximately .12 g/cc formed of closed cell foam material for air tightness is also provided. The sleeve 184 slidably engages in the direction of the arrow in Figure 27 onto the molded handle portion 186 to abut against stops or flanges 194 and 196 to prevent longitudinal movement therebetween.

As in all previous embodiments, this embodiment 180 includes outwardly laterally extending cavities 188 formed into the handle portion 186 which are sized, in combination with the volume and density selection of the sleeve 184 which sealably closes each of the cavities 188, to render this embodiment 180 of the invention buoyant in water.

Referring lastly to Figure 29, yet another embodiment of the invention is there shown generally at numeral 200 in the form of a fish gaff. This embodiment 200 also includes an elongated molded handle portion 206 formed of molded glass fiber reinforced NYLON having outwardly extending molded cavities 208 formed thereinto. A sheath 204 also formed of EVA as previously described and having a wall thickness of approximately

1/4", and a density of approximately .12 g/cc formed of foam material of a closed cell design for air tightness and lightweight characteristics, is also provided. The sheath 204 is assembled onto the molded plastic handle portion 206 against stops or flanges 214 and 216 of collar 210 and butt end 212, respectively. The combination of overall volume of the sealed cavities 208 filled with air when the sheath 204 is assembled and the total volume of the buoyant foam material used to form the sheath 204 collectively render this embodiment 200 buoyant in water such that the handle assembly 202 will float upwardly near or just above the surface of the water.

This embodiment 200 includes the gaff 218 having a pointed distal portion 220 for gaffing a fish. A molded protective cover 222 is held in position over the sharp distal point 220 for protection, a resilient band 214 interconnecting a collar 216 and the protective cover 222 also being provided.

Note that the working tool or implement which extends from the molded handle portion may take any useful form which is useful to a fisherman or others where buoyancy, non-conducting and non-corrosiveness features are important.

While the instant invention has been shown and described herein in what are conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein, but is to be afforded the full scope of the claims so as to embrace any and all equivalent apparatus and articles.